Find the equation/rule for the following sequences, and then find the 10th term:

1) 212, 220, 228, 236, ... $+8$

$a_n = 212 + 8(n-1)$

$a_{10} = 284$

2) 4, 12, 36, 108, 324, ... $\times 3$

$a_n = 4 \cdot 3^{(n-1)}$

$a_{10} = 78{,}732$

3) 350, 70, 14, 2.8, ... $\div 5$

$a_n = \frac{350}{5^{(n-1)}} = 350 \cdot \frac{1}{5}^{(n-1)}$

$a_{10} =$

1.792×10^{-4}

0.0001792

4) 906, 894, 882, 870, ...

5) 0, 2/3, 4/3, 2, 8/3, ...

6) 2, 10, 50, 250, ...

④ -12

$a_n = 906 - 12(n-1)$

$a_{10} = 798$

⑤ $+\frac{2}{3}$

$a_n = $ [illegible] $+ \frac{2}{3}(n-1)$

$a_{10} = 6$

⑥ $\times 5$

$a_n = 2 \cdot 5^{(n-1)}$

$a_{10} = 3,906,250$

Sequences & Series

Series = when the terms of a sequence are added. (sum)

if there is a set amant of terms (finite sequence)

ends

Ex: 3, 5, 7, 9, 11

finite

Ex: 3, 5, 7, 9, 11, ...

infinite

① $3+5+7+9+11$

$a_n = 3+2(n-1)$

$n = 1 - 5$

Sum notation

$\sum$ = Sigma = sum

end

$$\sum_{i=1}^{5} 3+2(i-1)$$

rule equation

start series

$$= 3+5+7+9+11 = 35$$

① $2+5+8+11+14$

pattern: $+3$

rule: $a_n = 2+3(n-1)$

$$\sum_{n=1}^{5} 2+3(n-1) =$$

2. $1+4+9+16$

pattern: square #'s

rule: n^2

$$\sum_{n=1}^{4} n^2$$

$$\sum_{n=3}^{10} 2n$$

$1+1+1+1\ldots$

$$\sum_{i=1}^{n} 1 = n$$

$$\sum_{i=1}^{50} 1 = 50$$

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

$1+2+3+4+5\ldots$

$$\sum_{i=1}^{30} i = \frac{30(31)}{2} =$$

$$\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$$

$$\sum_{n=1}^{100} i^2 = \frac{100(101)(201)}{6}$$

$$\sum_{i=1}^{n} \text{arith} = \frac{n(a_1 + a_n)}{2}$$

(30th term)

$$\sum_{i=1}^{30} 2+3(i-1) = \frac{30(2 + \quad)}{2}$$

1. 45

2. 7

3. 50

4. $\sum_{n=1}^{7} n(n+1)$

$= 2+6+12+20+30+42+56$

$= 168$

5) $\sum_{i=1}^{10} i^2 = \frac{n(n+1)(2n+1)}{6}$

$= \frac{10(11)(21)}{6}$

$= 385$

$\sum_{i=1}^{n}$ formula

6

$$\sum_{i=1}^{100} i = \frac{n(n+1)}{2}$$

$$1 + 2 + 3 + 4 \cdots\cdots + 99 + 100$$

$$= \frac{100(101)}{2}$$

$$= 5{,}050$$

7

$$\sum_{i=3}^{9} i(i+2)$$

$$= 15+24+35+48+63+80+99$$

$$= 364$$

8) $$\sum_{n=1}^{6} \frac{n}{2}$$

$$= \frac{1}{2} + \frac{2}{2} + \frac{3}{2} + \frac{4}{2} + \frac{5}{2} + \frac{6}{2}$$

$$\boxed{= 10.5 = \frac{21}{2}}$$

9

$$\sum_{i=1}^{4} i^3$$

$$= 1 + 8 + 27 + 64$$

$$= 100$$

10 $\sum_{n=1}^{7} 3+4(n-1)$

arithmatic

$a_1 + d(n-1)$

$a_1 = 3$

$$n\left(\frac{a_1 + a_n}{2}\right) = 7\left(\frac{3 + \cancel{}\,27}{2}\right)$$

$= 105$

11) $\sum_{i=1}^{5} 2 \cdot 3^{(i-1)}$

geometric

$a_1 \cdot r^{(n-1)}$

$a_1 = 2$

$$Sum = a_1\left(\frac{1-r^n}{1-r}\right) = 2\left(\frac{1-3^5}{1-3}\right) = 242$$

12 $$\sum_{i=3}^{8} 5(i-1)$$

arithmatic

$= 10+15+20+25+30+35$

$= 135$

ONLY (a)

p. 664 # 45, 47, 51–53

p. 671 # 60, 61, 63, 64, 68

$$\frac{n(a_1 + \overset{a_{20}}{\downarrow}{a_n})}{2}$$

45

$$20\left(\frac{3 + a_{20}}{2}\right)$$